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Balancing Resource Exploitation and Conservation: Indigenous Practices in Bintuni Bay, West Papua

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Abstract

West Papua is recognized as one of the regions with the highest biodiversity globally. Alongside this natural richness, the indigenous communities in areas such as Bintuni Bay have developed traditional ecological knowledge that has allowed them to manage the environment sustainably. These practices are passed down through generations and are reinforced by customary laws, taboos, and cultural rituals that remain relevant in modern times. The deep understanding of local ecosystems enables these communities to implement resource management strategies that maintain ecological balance and ensure long-term sustainability. However, increasing pressures from modernization, land clearance for plantations, mining, and infrastructure projects are posing significant threats to these traditional practices and ecological sustainability. The loss of indigenous knowledge not only endangers biodiversity but also disrupts cultural heritage and community resilience. This study explores the role of indigenous knowledge in environmental management, examining the balance between resource exploitation and conservation, disaster mitigation strategies, and the protection of cultural heritage, while highlighting the urgent need for its preservation in the face of growing environmental and developmental challenges.

Keywords: Indigenous knowledge, environmental sustainability, Bintuni Bay, customary law, biodiversity conservation

1. Introduction

West Papua is one of the regions with the highest biodiversity in the world. In addition, this region is also inhabited by indigenous people who have local wisdom in managing the environment sustainably (Keiluhu et al., 2023). One example is the indigenous people in Bintuni Bay, who use traditional ecological knowledge to maintain a balance between exploitation of natural resources and environmental conservation. This knowledge is passed down from generation to generation through cultural practices, customary laws, and taboos that remain relevant today (Indow et al., 2021).

Environmental sustainability has become a pressing global issue, especially due to the negative impacts of environmentally unfriendly modernization practices. In this context, the local ecological knowledge of indigenous peoples is an important asset that needs to be studied and applied to address sustainability challenges (Youdelis et al., 2021). For example, indigenous peoples in Bintuni Bay implement customary prohibitions to prevent excessive exploitation of their forests, land, and marine products. These prohibitions not only maintain the sustainability of natural resources but also protect the ecological function of the area (Leonita et al., 2022).

In addition to protecting the environment, indigenous peoples also have disaster mitigation mechanisms based on local wisdom. In Bintuni Bay, communities often use natural signs such as animal behavior and weather patterns to predict the coming of disasters (Arifanti et al., 2022). They also have conservation practices such as planting vegetation to prevent landslides and managing customary forest areas as ecological buffers. This knowledge shows that local wisdom is not only relevant to environmental sustainability but also to protecting communities from disaster risks (Harper et al., 2021).

However, the pressures of modernization and intensive exploitation of natural resources have threatened the sustainability of the ecological knowledge of indigenous communities in West Papua. In recent decades, land clearing for plantations, mining, and infrastructure projects have shifted the traditional lifestyles of indigenous communities (Thompson et al., 2020). This has led to a decline in cultural practices and customary laws that have long been the guardians of ecological harmony. If interventions are not immediately carried out to protect this local wisdom, environmental damage and the loss of cultural heritage can be inevitable impacts (Maturbongs et al., 2024).

The local wisdom held by indigenous communities in Bintuni Bay reflects important values such as mutual cooperation, respect for nature, and social responsibility. These values are instilled through informal education in families and communities, as well as through the implementation of traditional ceremonies (Aftab et al,.2022). By preserving this wisdom, indigenous peoples not only maintain their cultural identity but also make significant contributions to environmental conservation efforts (Sitorus and Harahap, 2022).

As one of the regions with unique ecology and culture, West Papua has great potential to become a model for environmental management based on indigenous peoples. Traditional practices such as zoning-based forest management, fishing bans during certain periods, and conservation of sacred areas are real examples of how indigenous peoples maintain ecosystem balance (Jones and Kobayashi, 2021). In this case, Bintuni Bay can be an inspiring example for other regions facing similar challenges.

Research on the ecological knowledge of indigenous peoples in Bintuni Bay is important to dig deeper into the values, practices, and strategies they use. In addition to contributing to academic literature, this study also aims to provide policy recommendations that support the strengthening of local wisdom as part of sustainable environmental management (Esiri et al., 2024).

The main objective of this study is to understand the key elements of the ecological knowledge of indigenous peoples in Bintuni Bay, including how they use natural resources wisely and protect the environment from damage. In addition, this study also aims to explore the role of customary law in maintaining ecological balance and how these values are passed on to the next generation.

By studying the local wisdom of indigenous people in Bintuni Bay, this study is expected to provide valuable insights for culture-based environmental management. The findings of this study can also be the basis for integrating traditional knowledge into public policy, so that local wisdom can be protected and utilized as a solution for environmental sustainability.

2. Methods

This study uses a qualitative approach with ethnographic methods to explore the ecological knowledge of indigenous communities in Bintuni Bay. This approach was chosen because it provides a deep understanding of the social and cultural phenomena that occur in indigenous communities, especially in terms of environmental and natural resource management. With this approach, researchers can explore the practices, values, and beliefs that are passed down from generation to generation by indigenous communities. Data were collected through in-depth interviews, participatory observations, and documentation studies related to traditions and customary laws that regulate environmental management.

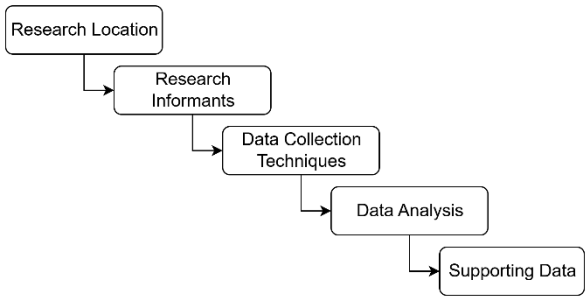

Figure 1: research flow

2.1. Research location

This research was conducted in one of the indigenous communities in the Bintuni Bay area, West Papua. This area was chosen because it has rich ecological diversity and indigenous communities that still maintain local traditions and wisdom in managing natural resources. This community is also known to have a fairly strong and consistent customary law system in carrying out environmental management practices. The research location includes residential areas, customary forest areas, and water areas that are an integral part of community life.

2.2. Research informants

The informants in this study consisted of traditional figures, tribal chiefs, community elders, and family members who play an active role in natural resource management. The selection of informants was carried out using the snowball sampling technique, where each main informant recommends other informants who have knowledge related to the research topic. This technique ensures that the data collected can cover various perspectives and experiences from indigenous peoples who are directly involved in environmental management practices.

2.3. Data collection techniques

Data collection in this study was carried out through three main techniques: in-depth interviews, participatory observation, and documentation studies. In-depth interviews were conducted with traditional figures and local communities to obtain information related to customary laws, taboos, and environmental management practices that they carry out. Participatory observation allows researchers to be directly involved in the daily activities of the community, such as traditional ceremonies, farming activities, and forest and water management processes. In addition, documentation studies were also conducted to collect data from customary law records, village documents, and literature related to environmental management.

2.4. Data analysis

Data collected from interviews, observations, and documentation were analyzed thematically, where researchers identified key themes that emerged from the data. The analysis process began with data reduction to select information that was relevant to the research topic. Furthermore, relevant data was presented in the form of narratives, tables, and diagrams to facilitate understanding. Conclusions were drawn after an in-depth analysis of the data that had been collected, to then be connected to existing theories and research objectives.

2.5. Supporting data

As supporting data for the research, information related to the population and area studied is very important. The indigenous community that was the subject of the research has around 150 families spread across the main settlement and several small settlements around it. Their customary territory covers around 1,000 hectares, consisting of customary forests, agricultural land, and waters used for social and economic activities. In addition, information regarding forest management practices and customary taboos, such as the prohibition on cutting trees without customary permission or the prohibition on fishing in certain seasons, are also relevant supporting data for this research.

3. Result and Discussion

Indigenous people in Teluk Bintuni use a highly structured natural resource management system, which includes sustainable use of forests, waters, and agricultural land. One of the main findings of this study is how indigenous people divide their territory into several zones, each of which has a specific function. This zoning system is regulated by customary law that binds all members of the community.

Table 1: Natural resource management by the teluk bintuni indigenous community

Management Aspects	Practice Description	Data Findings
Forest Management	Customary forests are divided into conservation zones, limited use zones, and settlement zones.	40% conservation zone, 30% limited use zone, 30% settlement zone
Customary Taboos	Prohibition of indiscriminate tree felling and fishing in certain seasons to maintain the sustainability of nature.	The community adheres to customary prohibitions regarding the prohibition of logging and fishing during the spawning season.
Agricultural Practices	Rotational farming to maintain soil fertility and protect biodiversity.	A farming rotation system is applied in traditional farming areas.
Water Conservation	Prohibition of fishing in the spawning season to maintain the sustainability of the fish population.	Strictly applied to water areas used for primary livelihoods.

3.1. Forest management

One important aspect in the management of natural resources by the Teluk Bintuni indigenous community is the management of customary forests, which are divided into three zones. The conservation zone covers around 40% of the customary forest area, which may not be utilized by anyone except for customary ritual purposes. The limited utilization zone (30%) is used for the extraction of wood, building materials, and other natural resources with strict rules regulated by customary law. The remaining 30% is used as a residential and agricultural area. This zoning division is very important to maintain ecological balance, prevent over-exploitation, and protect the ecological functions of the forest. With clear regulations, the indigenous people of Teluk Bintuni have succeeded in preserving their forests.

3.2. Use of customary law and prohibitions

Customary law in Teluk Bintuni is closely related to nature management, especially in limiting and regulating activities related to nature. This study found that each village has applicable rules regarding the use of natural resources, which include prohibiting the felling of trees without customary permission, as well as regulating certain times for fishing.

Table 2: Prohibitions and customary law

Types of Customary Law	Description	Impact on the Environment
Prohibition on Cutting Trees	Prohibition on cutting down trees without permission from traditional leaders.	Protecting forests and maintaining biodiversity.
Prohibition on Fishing	Prohibition on fishing during spawning season or in certain areas.	Maintaining fish populations and supporting sustainable fisheries.
Sanctions for Violations	Violation of customary law can be subject to social sanctions, such as customary fines or prohibition from participating in customary ceremonies.	Maintaining order and raising awareness of the importance of protecting the environment.

3.3. Biodiversity conservation

The indigenous people of Teluk Bintuni also have a strong management system for biodiversity conservation. Based on observations, they implement a zoning system that distinguishes areas that may be used for agriculture and those that must be protected. In addition, the community also maintains the natural habitat of certain species through customary rules.

Table 3: Biodiversity conservation

Protected Biodiversity	Protected Species	Conservation Practices
Forests	Hardwood trees (certain species)	Setting up conservation zones in customary forests.
Waters	Sea and freshwater fish (certain species)	Prohibition of fishing during spawning season.
Traditional Plants	Rice, tubers, local fruits	Rotational farming systems involving alternating land use.

3.4. Challenges faced by indigenous peoples

Although the indigenous people of Teluk Bintuni have managed to maintain most of their traditions in managing natural resources, modernization and excessive infrastructure development remain serious threats. Large-scale land clearing for agriculture, as well as uncontrolled exploitation of natural resources, often threaten environmental sustainability. Based on interviews with indigenous leaders, the biggest challenge is the imbalance between the economic needs of the community and environmental protection. Therefore, the role of the government and related parties in maintaining the integrity of customary rights and strengthening customary-based management is very important.

Table 4: Challenges faced by indigenous peoples

Challenges	Description
Exploitation of Natural Resources	Land clearing for plantations and mining that damages natural ecosystems and indigenous territories.
Modernization and Infrastructure Development	Infrastructure development projects that ignore environmental sustainability and threaten local wisdom.
Population Growth and Economic Needs	Increasing need for resources to meet higher consumption by local communities.

4. Conclusion

The indigenous people of Bintuni Bay, West Papua, are a powerful example of how traditional ecological knowledge can be used to sustainably manage natural resources. Their practices, such as forest zoning, fishing bans during spawning seasons, and rotational farming systems, demonstrate how a balance between natural resource exploitation and environmental conservation can be maintained. This indigenous knowledge not only supports the preservation of nature but also helps mitigate disasters through mechanisms based on local wisdom, such as predicting disasters using natural signs.

However, modernization and excessive exploitation of natural resources pose a real threat to the sustainability of this ecological knowledge. Land clearing for plantations, mining, and infrastructure projects have changed the lifestyles of indigenous peoples, threatening the continuity of traditions that have long maintained ecological balance. Therefore, it is important for the government and related parties to support the protection of indigenous rights and strengthen policies based on local wisdom to ensure that these traditions remain alive and continue to contribute to environmental sustainability in the future.

The indigenous people of Bintuni Bay, with their strong customary legal system and way of life in harmony with nature, offer important solutions to global sustainability challenges. Maintaining and utilizing their traditional knowledge will make a significant contribution to better and more sustainable environmental management.

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